

What is claimed is:

1. An anode electrode for a secondary battery having a cathode and an anode for releasing and receiving the same kind of metal ion therebetween, comprising:

5 an anode layer including at least one of: oxide, sulfide and salt of other metal which forms an alloy with the metal to be obtained by reducing the metal ion; and boron-added carbon,

wherein the anode layer has a thickness of 30 μm or less.

10 2. An anode electrode according to claim 1,
wherein the anode layer has a thickness between 1 μm inclusive and 30 μm inclusive.

3. An anode electrode according to claim 1,
15 wherein the other metal is at least one metal selected from tin, germanium, indium, lead, silver and antimony, and
the boron-added carbon is boron-added amorphous carbon or boron-added graphite.

20 4. An anode electrode for a secondary battery having a cathode and an anode for releasing and receiving the same kind of metal ion therebetween, comprising:

an anode layer including carbonaceous material;

wherein the anode layer has a thickness less than 1 μm .

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5. An anode electrode according to claim 4,
wherein the carbonaceous material is amorphous carbon or graphite.

6. A lithium ion secondary battery, comprising:

30 an anode electrode including an anode layer having at least one of: oxide,

sulfide and salt of metal which forms an alloy with lithium; and boron-added carbon;

a cathode electrode including a cathode layer; and

an electrolyte interposed between the cathode electrode and the anode
5 electrode;

wherein the anode layer has a thickness of 30 μm or less.

7. A lithium ion secondary battery according to claim 6,

wherein the lithium ion secondary battery has a structure including a
10 plurality of bipolar electrodes serially stacked by interposing electrolyte
therebetween, each bipolar electrode including a collector having one surface
formed with the cathode layer and the other surface formed with the anode layer.

8. A lithium ion secondary battery according to claim 6,

15 wherein the cathode layer includes a cathode active material which is a
lithium transition-metal composite oxide.

9. A lithium ion secondary battery according to claim 6,

wherein the electrolyte comprises polymer used in a gel form or solid
20 form.

10. A lithium ion secondary battery according to claim 6,

wherein the lithium ion secondary battery is used in an assembled battery.

25 11. A lithium ion secondary battery according to claim 10,

wherein the assembled battery is used for a vehicle.

12. A lithium ion secondary battery, comprising:

an anode electrode including an anode layer having carbonaceous
30 material;

a cathode electrode including a cathode layer; and
an electrolyte interposed between the cathode electrode and the anode electrode;

wherein the anode layer has a thickness less than 1 μm .

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13. A lithium ion secondary battery according to claim 12,
wherein the lithium ion secondary battery has a structure including a plurality of bipolar electrodes serially stacked by interposing electrolyte therebetween, each bipolar electrode including a collector having one surface
10 formed with the cathode layer and the other surface formed with the anode layer.

14. A lithium ion secondary battery according to claim 12,
wherein the cathode layer includes a cathode active material which is a lithium transition-metal composite oxide.

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15. A lithium ion secondary battery according to claim 12,
wherein the electrolyte comprises polymer used in a gel form or solid form.

20 16. A lithium ion secondary battery according to claim 12,
wherein the lithium ion secondary battery is used in an assembled battery.

17. A lithium ion secondary battery according to claim 16,
wherein the assembled battery is used for a vehicle.

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